Claims

1. A face seal fitting, comprising:

a first tubular element having an end face, an inner surface defining a flowpath and a first annular end formation projecting axially from the end face of said first tubular element;

a second tubular element having an end face, an inner surface further defining said flowpath and a second annular end formation projecting axially from the end face of said second tubular element; and

a metal gasket including

an inner section in the form of an annulus having an axis, and

a tapered section extending radially outward from said inner section, said tapered section defining two bevel faces directed away from one another and inwardly toward the axis of said annulus,

wherein said first annular end formation engages one of said bevel faces in a first region, said second annular end formation engages the other of said bevel faces in a second region, said first and second annular end formations have portions extending axially the farthest from the end faces of said first and second tubular elements, each said farthest extending portion lies on the inner surface of its associated tubular element and has an inner diameter, and said gasket has an inner diameter substantially equal to the inner diameters of said farthest extending portions, whereby dead volumes along the flowpath through said fitting are minimized.

2. The face seal fitting according to claim 1, wherein said first and second annular end formations each has a profile in axial section defining an arc intersected by a straight line lying along the inner

surface of its associated tubular element, the intersection of said line and said arc being at said farthest point.

3. The face seal fitting according to claim 2, wherein the inner surfaces of said first and second tubular elements are cylindrical adjacent to said annular end formations.

4. The face seal fitting according to claim 2, wherein the inner surfaces of said first and second tubular elements have flaring portions extending to said portions of said first and second annular end formations which extend axially the farthest from the end faces of said first and second tubular elements.

5. The face seal fitting according to claim 1, wherein said metal gasket further includes an outer section in the form of an annulus having a first axial dimension, said inner section is concentric with the annulus of said outer section and has a second axial dimension shorter than said first axial dimension, and said tapered section connects said outer section with said inner section.

6. The face seal fitting according to claim 1, wherein said face seal fitting has an optimal sealing condition in which said gasket is clamped between said first and second tubular elements, and said gasket, in a relaxed condition, has an inner diameter smaller than the inner diameter of said farthest extending portions of said first and second annular end formations,

said face seal fitting being movable between a first position, in which a non-sealing condition exists and said gasket is in its relaxed condition, and a second position, in which a sealing

condition exists and said inner diameter of said gasket is equal to the inner diameter of said farthest extending portions of said first and second annular end formations.

7. The face seal fitting according to claim 6, wherein each of said first and second annular end formations has a profile in axial section defining an arc intersected by a straight line lying along the inner surface of its associated tubular element, the intersection of said line and said arc being said farthest extending portion.

8. The face seal fitting according to claim 6, wherein the inner surfaces of said first and second tubular elements are cylindrical adjacent to said annular end formations.

9. The face seal fitting according to claim 8, wherein the inner surfaces of said first and second tubular elements have flaring portions adjacent to said annular end formations.

10. The face seal fitting according to claim 6, further comprising means for holding said tubular elements in sealing engagement with said gasket.

11. The face seal fitting according to claim 6, wherein said gasket further includes an outer section in the form of an annulus having a first axial dimension, said inner section is concentric with the annulus of said outer section and has a second axial dimension shorter than said first axial dimension, and said tapered section connects said outer section with said inner section.

12. The face seal fitting according to claim 6,

further comprising means for preventing movement of said face seal fitting beyond said second position.

13. The face seal fitting according to claim 12, wherein said movement preventing means comprises an outer section in said gasket, said outer section being interposed between said first and second tubular elements.

14. The face seal fitting according to claim 13, wherein said outer section is interposed between the end faces of said first and second tubular elements.

15. The face seal fitting according to claim 11, wherein said first and second annular end formations are in axial alignment with said inner section of said gasket and said tapered section of said gasket.

16. The face seal fitting according to claim 15, wherein said inner section and said outer section define side faces facing toward said first and second tubular elements, and the distance by which the first and second annular end formations project axially from their end faces is greater than the distance between each side face of the inner section of the gasket and the adjacent side face of the outer section of the gasket.

17. The face seal fitting according to claim 1, wherein said face seal fitting has an optimal sealing condition in which said gasket is clamped between said first and second tubular elements, and said gasket, in a relaxed condition, has an inner diameter equal to the inner diameter of said farthest extending portions of said first and second annular end formations,

said face seal fitting being movable between a first position, in which a non-sealing condition

exists and said gasket is in its relaxed condition, and a second position, in which a sealing condition exists.

18. A face seal fitting comprising a first conduit having an inner surface defining the outer boundary of a flowpath and having a radial end face having an annular nose projecting from said end face, a second conduit having an inner surface defining the outer boundary of a flowpath and a radial end face having an annular nose projecting from said end face, a metal gasket sandwiched between said end faces and making a sealing engagement with said noses, said gasket having an inner cylindrical surface having substantially the same diameter as the inner surfaces of said first and second conduits where said conduits engage said gasket, means to hold said end faces together sandwiching said gasket therebetween with axial pressure applied to said gasket, said end faces with said noses and said gasket being shaped when fully engaged under axial pressure applied by said means to fit together so that ~~only~~ no more than minimal dead spaces are defined between said gasket and said conduits at said inner surfaces and said inner surfaces define the outer boundary of a continuous flow path.

19. A face sealing fitting comprising a gasket and at least one tubular member, said tubular member having an inner diameter and an annular sealing bead projecting from a radial end wall of said tubular member, the annular sealing bead having, in axial cross section, a rounded outer profile shaped and positioned to engage said gasket to form a high pressure seal, and a rectilinear inner profile defining an open passageway within said tubular member adjacent to said gasket, so that no more than minimum dead volume exists in said fitting.

20. The face seal fitting according to claim 19, further comprising means for aligning said tubular element with said gasket.

21. The face seal fitting according to claim 19, wherein said gasket has an inner beveled section defining an annular beveled surface facing toward an axis of said gasket, an outer section, and, in a relaxed condition, an inner diameter smaller than the inner diameter of said tubular member, said inner beveled surface being arranged to engage said sealing bead and form a seal, said rounded outer profile is arranged to engage said beveled surface, and said fitting is movable between a first position, in which a non-sealing condition exists and said gasket is in its relaxed condition, and a second position, in which a sealing condition exists and said inner diameter of said gasket is equal to said inner diameter of said tubular member.

22. The face seal fitting according to claim 21, wherein said outer section has an axial dimension which limits compression of said sealing bead beyond its elastic limits by engagement with said radial end wall.

23. A method of making a seal in a face seal fitting including

a first tubular element having an end face, an inner surface defining a flowpath and a first annular end formation projecting axially from the end face of said first tubular element;

a second tubular element having an end face, an inner surface further defining said flowpath and a second annular end formation projecting axially from the end face of said tubular element; and

a metal gasket including

an inner section in the form of an annulus having an axis, and

a tapered section extending radially outward from said inner section, said tapered section defining two bevel faces directed away from one another and inwardly toward the axis of said annulus,

wherein said first annular end formation engages one of said bevel faces in a first region, said second annular end formation engages the other of said bevel faces in a second region, said first and second annular end formations having portions extending axially the farthest from the end faces of said first and second tubular elements, each said farthest extending portion lies on the inner surface of its associated tubular element and has an inner diameter, the method comprising:

engaging said bevel faces with said annular end formations; and

tightening said annular end formations against said bevel faces to enlarge the inner diameter of said gasket to a diameter substantially equal to the inner diameter of said farthest extending portions of said first and second annular end formations.